

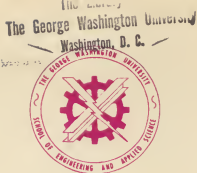
Mechelectic



Volume 22

May - 1964

No. 6



TO THE GRADUATING SENIORS

Honesty, justice and courtesy form a moral philosophy which, associated with mutual interest, constitutes the foundation of ethics. The engineer should recognize such a standard, not in passive observance, but as a set of dynamic principles guiding his conduct and way of life. It is his duty to practice his profession according to these Canons of Ethics.

As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employers and clients, and with fairness and impartiality to all. It is his duty to interest himself in public welfare, and to be ready to apply his special knowledge for the benefit of mankind. He should uphold the honor and dignity of his profession and avoid association with any enterprise of questionable character. In his dealings with fellow engineers he should be fair and tolerant.

Canon 1: The engineer will co-operate in extending the effectiveness of the engineering profession by interchanging information and experience with other engineers and students and by contributing to the work of engineering societies, schools and the scientific and engineering press.

from "Canons of Ethics for Engineers"

GEORGE WASHINGTON UNIVERSITY

MAY 1964

USAF F-105, unleashing air-to-ground rockets at simulated enemy target.



School's Out.

Right now, graduation seems way off in the wild blue yonder. But it's not too early to start planning. In the future, you'll look back on decisions you make today with satisfaction...or regret.

What can an Air Force career mean to you in tangible gain? The opportunity to take on executive responsibilities you might otherwise wait years to attain. And a head-start into one of a wide range of possible careers in the exciting Aerospace Age.

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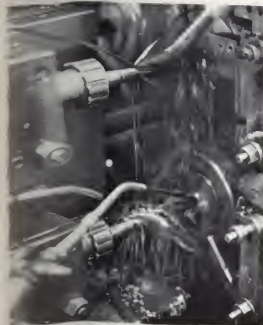
you may be flying a supersonic jet...helping to keep America's guard up. Or you may be in an Air Force laboratory, working to solve an intricate scientific or technological problem.

Doing jobs like these, you can hold your head high. In addition to being essential to your country, they're the beginnings of a profession of dignity and purpose.

For more information, see the Professor of Air Science.

If there is no AFROTC unit on your campus, contact your Air Force recruiter.

U.S. Air Force



Bob Turley, on right, American Oil Company Sales Engineer discusses cutting oil problem with Walter Binkley of Schwinn Bicycle Company.

**When you
drill·tap·form·mill·shape
all in 22 seconds...**

**what do you
use for oil?**

That's the kind of problem a sales engineer here at American Oil comes up against. It actually happened to Bob Turley when the Schwinn Bicycle Company asked him what oil he'd recommend for this complicated metal cutting problem. He had the answer—one of our special cutting oils—he solved the problem, and made the sale.

Bob's a graduate of Purdue—and the American Oil Company Sales Engineering School. He knows machines and oils. He's our "outside" man with the inside track on lubricants. And, he likes meeting people. That's why he's a sales engineer, combining two fields into a successful career.

Bob's a mechanical engineer. Yet, he might have been working for us if he were a metallurgist, chemist, mathematician or physicist. Petroleum takes on a multitude of uses and requires people of every skill. For information regarding a career in sales engineering or other fields, write to C. L. Wells, Room 1036, American Oil Company, 910 S. Michigan Avenue, Chicago, Ill. ZIP Code 60680

AMERICAN OIL COMPANY



THE BELL TELEPHONE COMPANIES

SALUTE: FRED BRIGHT

What's compatible with aeronautical engineering and telephone communications—Fred Bright (B.Aero.E., 1960). In less than three years, Fred has soared to success in the southwestern area of Ohio Bell.

Fred's first assignment consisted of preparing and presenting a series of courses designed to measure the technical competence of people who were being evaluated for promotion. Even though he had no previous experience in this field, the course material is still being used without any alterations.

Next, he was made an installation foreman supervising eight people. Besides maintaining the normal functions of this group, Fred inspired them to outproduce all other groups in the area.

Because of his previous accomplishments, Fred is now supervising all training in the area.

Fred Bright, like many young engineers, is impatient to make things happen for his company and himself. There are few places where such restlessness is more welcomed or rewarded than in the fast-growing telephone business.



BELL TELEPHONE COMPANIES

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Electronic Analog Simulation of Basic Hydraulic Parameters

by George E. Miller
George Washington University
April 24, 1964

On April 24 and 25, the ASME Regional Conference was held at The University of Delaware in Newark, Delaware. Some of the highlights of the conference included tours of nearby plant and test centers, meetings of faculty advisers, meetings of student officers, and most important, the presentation of student papers. There were approximately twenty schools represented and twelve papers presented. Our sincere congratulations go to George Miller for taking third place in the paper contest.

An analogy between two things exists when there is a similarity, not of the two things themselves, but of two or more attributes, circumstances or effects. For example, the same basic principles, such as the concepts of continuity and conservation of mass, can be applied in several fields of study and expressed in the form of differential equations which distinguish the parameters of each field.

Therefore, when the differential equations which characterize two fields of study are seen to be similar, the alert engineer notices the analogy existing between the two fields and thereby provides himself with a facility for interpreting the physical meanings of the various analogous terms. Specifically, the analogy permits the engineer to draw quantitative mathematical, or experimental, conclusions regarding phenomena in unfamiliar or difficult fields of study, in terms of analogous phenomena in better known or simpler fields of study.

One of the many conventional analogies is that which relates the fluid flow system to the electrical-conductance system. The general purpose in working with this particular analogy is that it allows the engineer to electronically simulate, and/or predict, the response of a fluid flow system which for some reason or other cannot be analyzed directly. There are approximately 50 such fluid systems distributed equally among us here in this room. I'm speaking of the human cardiovascular system with its unique blood flow characteristics.

A fluid-electrical analogy for a part of that system has been derived by Messrs. Wright and Kahn of the Harry Diamond Laboratories and is shown in his first figure.



FLUID

$p(t)$ = pressure
 $q(t)$ = vol flow
 R = viscous resistance
 C = compliance
 i = interface

ELECTRICAL

$e(t)$ = voltage
 $i(t)$ = current
 R_e = resistance
 C_e = capacitance
 L = inductance

$$i(t) = i_1(t) + i_2(t) \quad e(t) = \frac{1}{C_e} \int_0^t i(t) dt \quad i_1(t) = C_e \frac{d}{dt} e(t)$$

$$i_2(t) = i(t) - C_e \frac{d}{dt} e(t) \quad e(t) = R_e i_2(t) + L \frac{d}{dt} i_2(t)$$

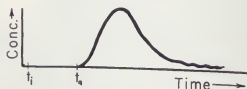
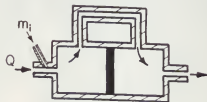
$$e(t) = R_e \left(i(t) - C_e \frac{d}{dt} e(t) \right) + L \frac{d}{dt} \left(i(t) - C_e \frac{d}{dt} e(t) \right)$$

$$L C_e \frac{d^2}{dt^2} e(t) + R_e C_e \frac{d}{dt} e(t) + e(t) = R_e i(t) + L \frac{d}{dt} i(t)$$

$$\left[C_e \frac{d^2}{dt^2} p(t) + R C_e \frac{d}{dt} p(t) + p(t) = R q(t) + L \frac{d}{dt} q(t) \right]$$

The sketch at the lower left shows a fluid model depicting a small segment of the cardiovascular system. The differential equation at the bottom of the figure represents the time course flow of blood volume and pressure within the system. The circuit diagram shows the arrangement of network impedances for simulating the above fluid model. Immediately below the diagram is illustrated the mathematical manipulations of node currents and voltages to develop the differential equation which describes the time course of voltage and current flow in the circuit. Since, as shown in the upper right of the figure, fluid-pressure, volume flow, viscous resistance, compliance, and inductance are analogous, respectively, to electrical-voltage, current, resistance, capacitance, and inductance — it is apparent that the lower two differential equations are similar. Therefore, the fluid system can be simulated with an electronic analog computer from which the engineer can rapidly obtain repetitive problem solutions by varying parameters with a slight twist of a dial.

The analogy just shown indicates that after writing a differential equation for a system it can be simulated with an analog computer. However, considerable analysis of a system must be made before a valid equation can be derived. An approach to system analysis is shown in this next figure. The diagram represents a closed system



or control volume having one inflow and one outflow orifice. Assuming Q as the rate of flow of an incompressible fluid the system is governed by the equation of continuity which results from the conservation of mass. Since mass is conserved

the net afflux rate across the entrance and exit control surfaces is equal. A further assumption that Q is large permits the instantaneous injection of a small quantity M into the system without a noticeable change in either flow rate or mass. However, since mixing is not instantaneous there will be some apparent concentration of the one fluid in the other. Furthermore, if the injected fluid is a diffusible indicator, such as indocyanine green, and the system fluid is human blood; then the concentration of dye in the blood is measurable using a densitometer or oximeter to screen the variation in optical density of the effluxing fluid. The density changes because the dye has a known volume distribution, or frequency distribution which disperses, as a function of time, the dye concentration leaving the system.

The lower part of the figure shows a typical dilution curve with concentration as the ordinate and time along the abscissa. The concentration appears at some time interval after injection, increases slowly at first, peaks rapidly, and then commences to decrease exponentially as the dye is cleared from the system. It is apparent from this curve that a sample of outflowing blood, taken at some time after injection, contains a dispersed dye concentration $c(t)$ which is a function of time. Therefore in any increment of time Δt the amount of dye passing the sampling site is

$$Q \ c(t) \ \Delta t$$

Since the whole of the dye M will pass the sampling point

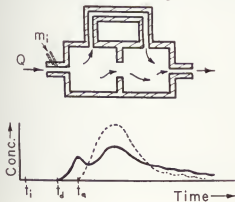
$$M = \int_0^{\infty} Q \ c(t) \ dt$$

Because Q is a constant it can be removed from the integral and set equal to the mass M divided by the integral from 0 to ∞ of $c(t) \ dt$.

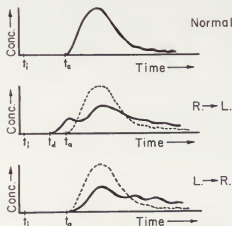
$$Q = M / \int_0^{\infty} c(t) \ dt \quad \text{or} \quad Q = M / c(t) \ dt$$

Therefore, the volume rate of flow Q can be determined from a known amount of dye and integration of the dilution curve. But integration is a complex process since a simple sine or exponential function cannot alone satisfy all points on the curve. However, there have been devised various methods to perform the integration, the most recent method, derived just a few weeks ago by Prof. Anand at George Washington University, was programmed in Fortran machine language for use with the IBM 1620 digital computer.

To increase the complexity of our analysis the next figure shows the same fluid system, but now it has a defective diaphragm. The arrows



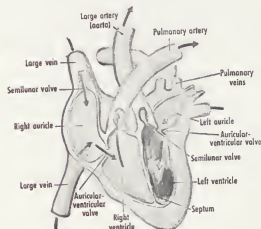
indicate that some of the dye passes directly to the outlet via the defect without traversing the larger normal pathway, and arrives at the sampling site before the portion that traverses the longer path. The dilution curve demonstrates the early arrival of that portion of the blood shunted right-to-left by the shortened appearance time and abnormal initial concentration superimposed on the build-up portion of the curve. If however, by some means, the shunt is from left-to-right the indicator will not be cleared rapidly, but will recirculate via the defect. In the next figure the lower dilution curve reflects this situation and is contrasted to a normal curve appearing as a broken line. The maximum concentration of the bottom curve is reduced because the indicator is dispersed and diluted in a larger volume. The disappearance phase is prolonged



owing to the slow clearance of dye from the system.

I'm sure at this point many of you are aware that the previously discussed two-chamber fluid system which conducts blood and dye is a simplified model of your heart.

This next figure illustrates the analogy between the two fluid chambers separated by a diaphragm and the heart's right and left ventricles divided from one another by the septum. Notice



that blood, after circulating through the body enters the right atrium, passes into the right

(Continued on page 23)

THE RETURN OF THE SQUARE

By Charles H. Brower

A recent speech -- by the distinguished head of one of the nation's largest and best-known advertising and public relations firms -- which has received much attention and is being widely quoted and reprinted. The remarks of the speaker are especially appropriate amidst the political and social nostrums which are being currently advanced, and they enunciate clearly some of the words of wisdom the past has taught us but which seem seldom remembered today. What is said is so pertinent -- and so needed -- that there is reproduced here the full text of this memorable address.

Back in the days before the phrase "Going to His Eternal Rest" meant getting a job with the government, Mark Twain was scheduled to make a talk. Noticing that his lecture was poorly billed, he stepped into a store and said:

"Good Evening, friend -- any entertainment here tonight to help a stranger while away his evening?"

The storekeeper straightened up, wiped his hands and said: "I expect there's going to be a lecture. I've been selling eggs all day."

There have been quite a few changes made since that day. Although the price of eggs may prohibit their use as indoor guided missiles, we have become so well to do as a nation that we have a guilt complex about it. Conformity is sweeping the country. And, while more and more people want to get seats in the grandstand, fewer and fewer want to sweat it out down on the field. More and more youngsters who come in looking for jobs are asking, "What can you do for me?" rather than, "What can I do for you?" They want to discuss the extras they're going to get rather than the extras they're going to give. They want to know how cool it is going to be in summer -- and how warm in winter. And how safe at all times of the year. And when they go to work, they hasten to hide their light in the security of a committee, where there is safety in numbers. The progress may be slow and the glory may be small, but the work is steady. Their eyes are on the clock rather than on the calendar. The Coffee Break is more important than the Big Break.

More and more girls are more interested in filing their nails than in filing what needs to be filed. The other day I overheard two girls in an elevator; one said to the other, "Heavens, no, don't learn shorthand. If you can't take dictation, you won't have to stay after 5 p.m."

We have always had our share of freeloaders in this country. As Channing Pollock once said, every generation produces its squad of moderns who march with peashooters against Gibraltar. But only in the past quarter century, it seems to me, has non-involvement become an accepted way of life. When we were poor, we had to sweat it out.

We couldn't afford detachment from the life and fate of our country -- and one of the great dangers of affluence is that it permits such detachment.

I'm going to mention quite a bit about a six-letter word. Why six letters? Because modern literature has snapped up all the four- and five-letter words as its own. So I am going to start on six-letter words: the word is "square" -- SQUARE.

Back in Mark Twain's day, it was one of the finest words in our language, among the top ten on any lexicographer's hit parade. You gave a man a square deal if you were honest. You gave him a square meal when he was hungry. You stood foursquare for the right, as you saw it, and square against everything else. When you got out of debt, you were square with the world. (And that was when you could look your fellow man square in the eye.)

Then a lot of strange characters got hold of this honest, wholesome word, bent it all out of shape and gave it back to our children. Convicts gave it the first twist. To them a "square" was an inmate who would not conform to the convict code. From the prisons it was flashed across the country on the marijuana circuit of the bopsters and hipsters. Now everyone knows what a square is. He is the man who never learned to get away with it. A Joe who volunteers when he doesn't have to. A guy who gets his kicks from trying to do something better than anyone else. A boob who gets so lost in his work that he has to be reminded to go home. A guy who doesn't have to stop at a bar on his way to the train at night because he's all fired up and full of juice already. A character who doesn't have to spend his evenings puttering in a basement workshop and his weekends scraping the bottom of a boat because he's putting all that elbow grease and steam into doing a satisfying job on the job he's getting paid to do. A fellow who laughs with his belly instead of his upper lip. A slob who still gets all choked up when the band plays "America the Beautiful." A square -- strictly from Squaresville.

His tribe isn't thriving too well in the current climate. He doesn't fit too neatly into the current group of angle players, corner cutters, sharpshooters and goof-offs. He doesn't believe in opening all the packages before Christmas. He doesn't want to fly now and pay later. He's burdened down with old fashioned ideas of honesty, loyalty, courage and thrift. He may already be on his way to extinction.

He and all the rest of us are living in a country today that is quite different from the one that we were taught to love.

We have come quite a way since Theodore Roosevelt told us: "Far better it is to dare mighty things, to win glorious triumphs, even though checkered by failure, than to take rank with those poor spirits who neither enjoy much nor suffer

much, because they live in the gray twilight that knows not victory nor defeat."

What has happened to us, I think, is that we have changed from an exporting country to an importing country.

I do not mean that we have let the world drain all of our gold away, although that is bad enough. I do not mean any imbalance of trade — threatening as that may be. I mean that we have been importing instead of exporting ideas.

The United States of America was once the greatest exporter of ideas the world had ever known. We created and sold abroad the idea of individual dignity, responsibility and freedom. We created and sold the idea of government of the people, by the people and for the people — an idea that is still being bought today. We exported the idea of freedom of worship; the idea of unfettered press; the idea that those who are taxed should be represented.

It is hard to find a basic idea that America has exported since you and I were young. We have, I think, bought in the bazaars of Asia Minor the idea that an honest man is either a fool or a liar. From our most mortal enemy we have bought the idea of a strong government for weak people. We have bought abroad the ideas of "Let Jack Do It," of "What's in It for Me?" — and the gesture of the neatly shrugged shoulder.

The other day I was told by a friend that his young son came home from his progressive school proudly exhibiting a book that he had won for excellence in local history.

"However did you do that?" the delighted father asked.

"The teacher," answered the son, "asked how many legs an ostrich has and I said three!"

"But an ostrich has only two legs," the father protested.

"I know," said the boy. "But I came closest. All the other kids said four."

This may be funny. But it is not funny that today our colleges are loaded with youngsters who are hardly prepared for high school — kids who cannot do simple arithmetic and who cannot spell simple words. This, too, was an import — the idea that the dull discipline of the three R's was disturbing to little Johnny's ego. We got really scientific and went to work on the poor little kid and his Id with the result that today hardly any school that really is a school is without a class in remedial reading. It would save considerable money if the class were held in the highest level of our teachers' colleges and were called "Remedial Thinking."

Our museums today are exhibiting on their walls paintings by people who never learned to paint. It used to be a sort of joke that you could not tell which was the top and which was the bottom.

Non-books are being thrown together and sold by non-writers who never bothered to learn how to write. Murky poems are being ground out by scraggly poets who sing them to their friends because they are unreadable. Here, for example, is one deathless line: "O man, thee is onion-constructed in hot gabardine."

Life magazine describes our beatnik genuises as "fruit flies . . . some of the hairiest, scrawniest and most discontended specimens of all time, who not only refuse to sample the seeping juices of American plenty and American advance but

scrape their feelers in discordant scorn of any and all who do."

Some of their output is worse than trash; some of it goes beyond making fun of Mom and Dad and marriage and automatic dishwashers and Suburbia.

Always tearing down these days. Never building up. Always knocking. Belittling. Down-grading. A sneer rather than a grin. A mocking laugh rather than a belly laugh. Poking fun at other people rather than at ourselves.

What, by the way, ever happened to laughter? Once we were a laughing nation. We laughed easily and deeply. The corn may have been as high as an elephant's eye — but we laughed, and it was good for us. We laughed at Lincoln, Mark Twain, Artemus Ward, Mr. Dooley, and Petroleum V. Nashby. Later, we laughed at the gentle humor of such columnists as Don Marquis, F. P. A. and H. I. Phillips. We laughed at Will Rogers because he made us laugh at ourselves. Remember the sly, dry way he spun that rope and those yarns and got off those wonderful quips of his about life in general and politics in particular?

We laughed at Robert Benchley. Remember when a magazine sent him on an assignment to Venice and he wined back, "Streets full of water. Please advise."?

Today I think there is one true comic on the stage, and one real humorist writing a column. I am talking about Bob Hope and Art Buchwald. Others are cynical, sly and bitter. We laugh when we are told that everyone but squares knows that Mr. A or Mr. B is funny, but we don't know why we are laughing.

We refer to our humor as sick, sick, sick and it is, is, is. Mother used to get cards on Mother's Day expressing in some way the fact that she was loved and wanted. Now if she is lucky she gets a card that shows "Whistler's Mother" flat on her back and a caption that says, "You're not the only one who's off her rocker." Otherwise, she may get a card that says, "Want to lose 15 ugly pounds? Then cut off your head."

Mort Sahl, to me, represents the cackling of despair. Even Bob Newhart, clean-cut and buttoned-down as he is, cannot resist the temptation to give a hotfoot now and then to our national idols.

I claim we need those idols. I am not going to be amused by a skit in which Lincoln's publicity man tells him "Write it on envelopes, Abe," or "Why don't you take it easy tonight, Abe, and take in a show?"

Laughter today is stored in Hollywood in cans, just as the gold was once stored at Fort Knox. It is taken out as needed and pasted onto television films. The laugh track tips us off to when things are funny.

I want to laugh when I am amused. I want to decide what I think is funny. This, I suppose, will mark me as a square. If it does, I will be in pretty good company. For this country was discovered, put together, fought for and saved by squares. It is easy to prove that Nathan Hale, Patrick Henry, Paul Revere, George Washington, Benjamin Franklin and almost anyone else you care to include among our national heroes were squares — by simply thinking what each might have said had he not been square.

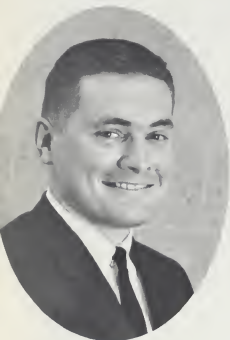
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Car, Martial (BME)



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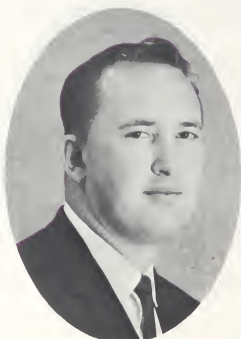


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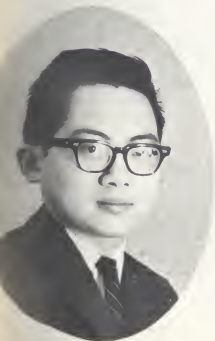
Thomas, John R. (BEE)



Thompson, Kenneth W. (BEE)



Tobias, Jerome J. (BCE)



Wen, Howard H. (BME)

Seniors whose pictures do not appear:

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Krul, Peter (BEE)

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Massey, William E. (BME)

Olstaffe, Wasyl (BEE)

Paleologos, Nicholas G. (BCE)

Rohde, Wilfred A. (BCE)

Yuen, David (BEE)

ENGINEERS'

AWARDS

NIGHT

29 April 1964 — Tompkins Hall. The Annual Engineers' Awards Night, featuring the presentations of awards from the various societies and organizations of the School of Engineering and Applied Science, was held here tonight, in Room 200, before a record turnout of guests.

Opening the evening, Mr. Joseph Hailer, chairman of the event, introduced representatives from the ASCE, ASME, and the IEEE. The awards that were presented by these societies were:

ASCE — Outstanding Student Member —
Mr. William Rohde

ASME — Outstanding Student Paper —
Mr. George Miller

IEEE — Outstanding Washington Section
Student Award —
Miss Judith Popowsky

Outstanding National Student
Award —
Mr. Richard Shearer

Following these presentations, the honor societies were called upon to honor the outstanding class members for 1962-1963. Mr. Walter Crater, speaking for Tau Beta Pi, announced the recipient of the Outstanding Sophomore Award, Mr. Morton Tarragin. Mr. Norman Seidle then announced that Mr. Francis Lebeau had been chosen by Sigma Tau as the Outstanding Freshman. Sigma Tau also presented the Shingles of membership to those persons who were recently initiated into the Society.

The MECHELECIV Magazine, represented by Judith Popowsky, awarded keys to those members of the staff who had served for one semester

or more, and who had not previously received keys. The recipients are:

Mr. Martial Car Mr. Robert Hamm

Mr. Jerry Edwards Mr. Philip Kaplan

Mr. Robert Millard

The Engineers' Council also awards keys to its members who have served for one and one-half semesters and who have not previously received keys. These members are:

Mr. Martial Car Mr. Thomas McIntosh

Mr. Jerry Edwards Mr. Robert Millard

Mr. Joseph Hailer Mr. William Pryor

Mr. Erling Jacobsen Mr. Orville Standifer

The outgoing President of the Engineers' Council, Mr. Richard Singer, received a gavel, in commemoration of his service to the Council. Because Mr. Singer was unable to attend the Awards Night, Mr. Lee "Chip" Young, the incoming President of the Council, accepted the gavel for Mr. Singer.

The final, and most significant, award of the evening was the Deacon Ames Award, sponsored by Theta Tau Professional Fraternity. This award, in memory of Professor Norman B. Ames, is given to the graduating senior who, in the eyes of his fellow students, has shown outstanding leadership and service to the School. This year, the MECHELECIV is proud to announce that the Deacon Ames Award was presented to the 1964 Engineers' Week Chairman, Mr. Thomas McIntosh.

THE MECHELECIV

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Vice President	Harold Freed	Advanced Representative
Secretary	John Scott	ASCE Representative
Assistant Secretary	Perry Saidman	Intro., 2nd Year, Representative
Treasurer/Business Manager for MECHELECIV	Judith Popowsky	IEEE Representative

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ELECTED TO WHO'S WHO IN AMERICAN COLLEGES AND UNIVERSITIES

Miss Judith J. Popowsky, BSME

Institute of Electrical and Electronic
Engineers:

Secretary
Vice President
Representative to Engineers' Council (1964-
65)
IEEE Washington Section Outstanding Stu-
dent Member at G.W.U.

American Society of Mechanical Engineers

Pi Delta Gamma, National Journalism Honorary

MECHELECIV Engineering School Magazine

Assistant Editor-in-Chief
Editor-in-Chief (1964-65)
Business Manager (1964-65)

Engineers' Council

Member-at-Large
Junior Class Representative
Secretary
Vice President
President
Treasurer (1964-65)

Sigma Tau National Engineering Honor
Fraternity

Secretary (1964-65)

Mister Richard Singer, BME, 1964, February

Engineer's Council:

Sophomore Representative
Vice President
President

American Society of Mechanical Engineers

Order of Scarlet

Theta Tau Professional Fraternity

Corresponding Secretary
Regeant

THETA TAU OFFICERS

Regeant	Vance Cribb
Vice Regeant	Larry O'Callahan
Scribe	Gordon Davison
Assistant Scribe	Frank Moy
Treasurer	Lee "Chip" Young
Corresponding Sec.	Millard Carr
E.C. Representative	Robert Mullen

NEW INITIATES

Robert Mullen, Frank Moy, John Bauers-
field, Martin Felker, Steve McIntyre, Larry
Hillman.

THE MECHELECIV

TAU BETA PI

Fall, 1963 Initiates

Walter Crater
Philip Kaplan
Thomas McIntosh

Spring, 1964 Initiates

Morton Taragin
Dillon Scofield
Francois Fougerat
Shanti Chakravarty
Lou Wagman

1964-1965 Officers

President Walter Crater
Vice President Philip Kaplan
Recording Secretary Dillon Scofield
Corresponding Secretary Shanti Chakravarty
Treasurer Morton Taragin

SIGMA TAU

Fall, 1963 Initiates

Shanti Chakravarty
Malcolm Costello
Walter Crater
Ely Fishlowitz
Francois Fougerat
Abdul Haideri
Philip Kaplan

Jean Lavanceau
Joseph Moulton
Judith Popowsky
Dillon Scofield
Vytas Tarulis

Spring, 1964 Initiates

William Chan
Rudolph Decatur, Jr.
David Lee
Douglas MacDonald
George Miller
Lawrence Nivert
Russell Thomas

1964-1965 Officers

President Norman Seidle
Vice President Shanti Chakravarty
Secretary Judith Popowsky
Treasurer Walter Crater
Pyramid Correspondent William Kolb
Historian Douglas MacDonald
Engineers' Council
Representative Vytas Tarulis

HONORS LIST

FALL - 1963



The Honors List contains "...in alphabetical order, the names of candidates for an undergraduate degree in engineering whose scholastic achievement satisfies all of the following requirements.

- "a) The candidate's cumulative quality-point index is equal to or exceeds 3.00.
- "b) At least 30 semester hours credit has been earned as a degree candidate in the School of Engineering and Applied Science.
- "c) At least 15 (part-time students) or 30 (full-time students) semester hours credit in an engineering degree curriculum has been earned in the immediate two consecutive semesters.
- "d) No grade below "C" has been received during the qualifying period stated in (c) above.
- "e) No disciplinary action has been taken in respect to the student."

ALONSO, Carlos A.

CAFFO, John A.

CHAKRAVARTY, S.

CHIERICI, Alessandro

DILLON, Thomas P.

FLOWERS, Earl C.

FOUGERAT, Francois A.

HANSEN, James P.

KAPLAN, Philip B.

KHOZEIMEH, Khal.

LeBEAU, Francis S.

LOWE, Douglas W.

MITCHELL, Reginald

NEMECHEK, John

NIVERT, Lawrence

PULFREY, Robert

REAMY, Richard

SCOFIELD, Dillon

SHADID-NOORAI, Farid

STANDIFER, Orville, Jr.

TARAGIN, Morton F.

TINLEY, Thomas N.

WAGMAN, Louis



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American Telephone & Telegraph Co.	2
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Muth	21
G. W. Delicatessen	21
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General Electric	Back Cover



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NAME _____ CLASS _____

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CITY _____ STATE _____

SCHOOL _____

Nathan Hale: Me spy on those British! Are you trying to be funny? Do you know what they do with the spies they catch? I'll give you a news flash, chum. They hang them.

Paul Revere: What do you mean -- me ride through every Middlesex village and town? And in the middle of the night yet. Why pick on me? Am I the only man in Boston with a horse?

Patrick Henry: Sure, I'm for liberty. First, last and always. But we've got to be a little realistic. We're a pretty small outfit. If we start pushing the British around someone is going to get hurt.

George Washington: Gentlemen, I am honored. But I do wish you would try someone else. Let's say General Gates. I'm just getting things organized at Mount Vernon. You might say I had already served my time. Against the French, you know.

Benjamin Franklin: What we really need as Ambassador to France is a young man. I'm 70 years old! It's time a new generation took over.

It is perhaps a significant fact that what such men actually did say has been quietly sneaked out of our schoolbooks. This Week magazine made a survey recently of school history books issued before 1920, compared with those issued since. Nathan Hale said, "I regret that I have but one life to give for my country," in all of the old texts and in only one of the new texts.

Patrick Henry said, "Give me liberty or give me death" in 12 out of 14 earlier texts and in only two of 45 recent ones.

But John Paul Jones set the record. He said, "I have not yet begun to fight," in nine of the old books and in none of the new ones.

When Dwight D. Eisenhower was President he appointed a Committee on National Goals to decide where we were all going. Perhaps a first step should be a commission on national heritage to make sure that some of us at least remember where we have been.

Arnold Toynbee, the historian, says that of 21 notable civilizations, 19 perished not from external conquest but from the evaporation of belief within.

Today, our country still has a choice. I believe it has already begun to make that choice. I believe it is going back to its old beliefs in such things as ideas, pride, patriotism, loyalty, devotion and even hard work.

We are great believers in statistics in this country -- and while the things that really count can never be measured even by the most advanced computers -- sheer head-counting seems to indicate that people are beginning to struggle for better things.

Twenty years ago, half of us belonged to churches. Today 64 per cent of us do. It is perfectly possible that the churches are full and the people are empty -- but the statistics are on our side.

Sales of classical records have jumped 78 per cent in the last three years. Advertising, perhaps, but the statistics are on our side.

Millions of people are visiting museums, millions more than a decade ago.

We spent over a billion dollars on books last year, and people are taking 670 million volumes out of our public libraries each year.

There are 50 per cent more symphony orchestras than there were ten years ago. Ex-

penditures on all cultural activities have increased 70 per cent in the past ten years -- to a total of more than 3,000,000,000 dollars.

You might point out to me that 3,000,000,000 dollars spent for culture, stacked up against 50,000,000,000 spent for war still isn't much. You will have to admit that there is a definite movement -- and in the right direction.

Since the turn of the century, the percentage of our population that has graduated from high school is up ten times. The percentage that has gone to college is up seven times. The percentage in higher education who are trying to get higher marks is encouragingly greater than it used to be. There are indications that the day when it's smart to be smart is finally at hand.

But the greatest thing that has happened, of course, is that our nation has a whole new set of heroes -- named Glenn and Grissom and Shepard -- and Carpenter, Cooper and Schirra.

The forces of conformity are still strong. Too many of us are still sitting it out instead of sweating it out. Too many of us haven't got the guts to stand up straight and dare to be square because the opposite of square is round and being round is much simpler. Responsibilities and problems roll off easily. We can just roll down the path, without any bumps, being careful to stay in the middle because that's where the most comfortable ruts are.

Too many of us know the short cuts, and too few know or care where the path leads. Too few of us dare to leave the path because the path is always the easy way, the way most people go. But there is no path to the future, no path to greatness, no path to progress.

How shall we fight for personal independence? How shall we avoid the group poop, the vortex of mediocrity, the great nothing of cynical sophistication?

May I suggest that we all join the S.O.S.? The Society of Squares. It doesn't even exist but it could. Not a left-wing organization. Not a right-wing organization. Just an organization with wings!

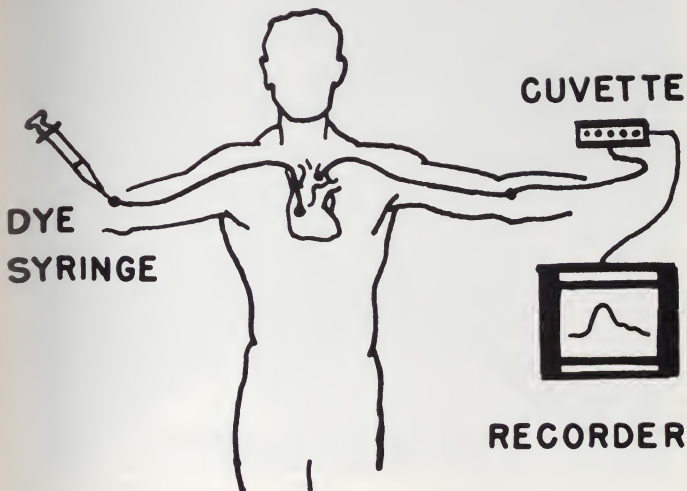
We might have to go underground for awhile to avoid being trampled to death by the coast-to-coast rat-packs of cynical saboteurs and the canned-wit commandos whose devotion is to destruction.

But we would come out. We might even have a secret handshake consisting mainly of grabbing the other guy's hand as though you meant it and looking him in the eye.

We would be for participation and against sitting life out, for simplicity and against sophistication, for laughter and against sniggering, for America and against her enemies, for the direct and against the devious, for the honest way against the short, for a well-done job and against the goof-off, for education and against the pretense of learning, for building and against tearing down, for the boys and girls who excel and against the international bedroom athletes.

We have, at least, the satisfaction of knowing that our problem is not new.

When Benjamin Franklin was told that the war for independence was over, he said, "Say rather the war of the revolution, the war for independence has yet to be fought." And today -- 180 years later -- the war for independence has still to be fought.




ventricle, and out thru the pulmonary artery to the lungs. As the blood is drawn thru the lungs, CO_2 is removed and life sustaining oxygen is added. (It is oxygen in the blood which gives it a red color.) Returning from the lungs to the left ventricle the blood is finally pumped out via the aorta for subsequent arterial circulation thru the body. Observe, however, that a septal defect will allow the blood to bypass the lungs and thereby decrease cardiac output.

Investigation of septal defects in the heart is a current research problem being sponsored by the U.S. Public Health Service. Research is being conducted at George Washington University by Dr. James Cooper and Prof. D. K. Anand. Prof. Anand is directing my study toward simulation on an analog computer of the cardiac system thru application of fluid-electrical analogies.

Analysis of the heart poses many engineering problems since it is inaccessible. Measurements of flow parameters made while the heart is ex-

posed may not reveal its normal function because its environment is altered and its activity distorted. However, there are means of obtaining realistic information with the heart intact. Such a means is cardiac catheterization. The next figure illustrates how a nylon catheter is inserted in a vein and observed under a fluoroscope until it reaches the right side of the heart. Likewise, another catheter attached at one end to a cuvette densitometer and recorder is passed thru an artery till it reaches the left side of the heart. An injection of indocyanine green dye will produce a concentration curve which when evaluated determines cardiac output. In addition, septal defects can be detected from the curve plot. It is our goal to determine by electronic analog simulation the size of the defect and thus eliminate the need for exploratory surgery. This is important since the growth of defects which can be tolerated when their size is small, can be monitored.



First, what is the obvious? It's obvious that you're in demand. You don't have to worry about getting your material wants satisfied. And you don't have to worry about getting opportunities for professional growth.

But, if you look beyond the obvious, you'll realize now that you're going to want something more than material rewards from your career. You're going to want **pride**—pride in your personal, individual contribution.

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Look beyond the obvious . . .

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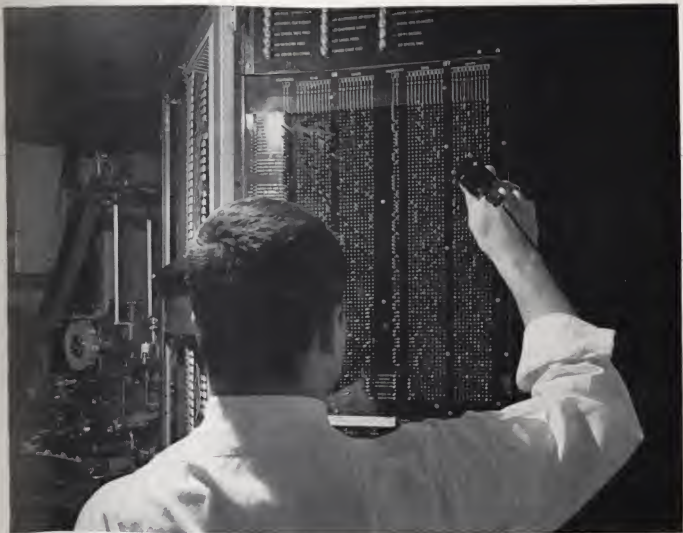
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TURN OUT THE LIGHTS AND PRESS THE BUTTON

No preconceptions, please. Too often they point you away from the buried treasure. Because Kodak is properly known as a grand place for chemical engineers and chemists, fledgling electronic engineers may overlook us. All the better for those who don't. Particularly for those who would rather apply ideas than dream them, unfashionable as candor compels us to sound.

It takes all kind of electronic engineers to make today's world, but we think we clearly see the ones likely to wind up nearer the helm here 25 years hence:

When his projects are evaluated, he'd rather be right than ahead of his time.

He works few if any miracles with sealing wax, old shoestring, and new developments in plasma harmonics, but when they turn off the lights in the big darkroom, his machine from the very first crack starts inspecting,

processing, or otherwise handling light-sensitive product smoothly, bugless, and at the miraculous rates he had promised in the preliminary design report. He accomplishes this by keeping abreast of the state of his art instead of considering his diploma an exemption from learning anything new.

He deals with people as smoothly as with things.

He would rather put his roots down in the community where he lives than root himself in one narrow box of engineering specialization. He welcomes changes of pace more than of place.

He finds it cozy to know that if times change, our diversification leaves dozens of directions to go without fighting the cold world outside.

Care to talk to us? Above remarks apply to more than just electronic engineers.

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Advancement in a Big Company: How it Works

An Interview with General Electric's C. K. Rieger, Vice President and Group Executive, Electric Utility Group



C. K. Rieger

■ Charles K. Rieger joined General Electric's Technical Marketing Program after earning a BSEE at the University of Missouri in 1936. Following sales engineering assignments in motor, defense and home laundry operations, he became manager of the Heating Device and Fan Division in 1947. Other Consumer-industry management positions followed. In 1953 he was elected a vice president, one of the youngest men ever named a Company officer. Mr. Rieger became Vice President, Marketing Services in 1959 and was appointed to his present position in 1961. He is responsible for all the operations of some six divisions composed of 23 product operations oriented primarily toward the Electric Utility market.

Q. How can I be sure of getting the recognition I feel I'm capable of earning in a big company like G.E.?

A. We learned long ago we couldn't afford to let capable people get lost. That was one of the reasons why G.E. was decentralized into more than a hundred autonomous operating departments. These operations develop, engineer, manufacture and market products much as if they were inde-

pendent companies. Since each department is responsible for its own success, each man's share of authority and responsibility is pinpointed. Believe me, outstanding performance is recognized, and rewarded.

Q. Can you tell me what the "promotional ladder" is at General Electric?

A. We regard each man individually. Whether you join us on a training program or are placed in a specific position opening, you'll first have to prove your ability to handle a job. Once you've done that, you'll be given more responsibility, more difficult projects—work that's important to the success of your organization and your personal development. Your ability will create a "promotional ladder" of your own.

Q. Will my development be confined to whatever department I start in?

A. Not at all! Here's where "big company" scope works to broaden your career outlook. Industry, and General Electric particularly, is constantly changing—adapting to market the fruits of research, reorganizing to maintain proper alignment with our customers, creating new operations to handle large projects. All this represents opportunity beyond the limits of any single department.

Q. Yes, but just how often do these opportunities arise?

A. To give you some idea, 25 percent of G-E's gross sales last year came from products that were unknown only five or ten years ago. These new products range from electric tooth brushes and silicone rubber compounds to atomic reactors and interplanetary space probes. This changing Company needs men with ambition and energy and talent who aren't afraid of a big job—who welcome the challenge of helping to start new businesses like these. Demonstrate your ability—whether to handle complex technical problems or to manage people, and you won't have long to wait for opportunities to fit your needs.

Q. How does General Electric help me prepare myself for advancement opportunity?

A. Programs in Engineering, Manufacturing or Technical Marketing give you valuable on-the-job training. We have Company-conducted courses to improve your professional ability no matter where you begin. Under Tuition Refund or Advanced Degree Programs you can continue your formal education. Throughout your career with General Electric you'll receive frequent appraisals to help your self-development. Your advancement will be largely up to you.

FOR MORE INFORMATION on careers for engineers and scientists at General Electric, write Personalized Career Planning, General Electric, Section 699-11, Schenectady, N. Y. 12305

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